Beyond the Decibel – Managing Noise from Outdoor Concert Venues

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Abstract - There is more to managing the community noise impacts of large outdoor concerts and festivals than simply setting a noise limit. An analysis of the data associated with outdoor concerts in Brisbane has identified that the risk of noise complaints is influenced by many factors other than the noise limits for the concert. The scheduling of events, frequency of events, event location, event duration, music genre and community engagement and attitudes can be more significant than the noise limits alone. This paper will explore all these factors and how understanding their influence on the community can enable noise regulators to go beyond the decibel to minimise the risk of noise complaints from large outdoor concerts and festivals.

1 INTRODUCTION

Brisbane City Council has managed the community noise impacts of outdoor concerts and festivals via a Council local law since 1999, except where the concert is held at a major stadium (in which case it is managed by the Queensland Government) or the Brisbane Riverstage (which is managed by Brisbane City Council via a Noise Management Plan).

There are a number of outdoor concert venues in Brisbane that have hosted events on a regular basis for over 20 years, and a number of locations that host outdoor concerts and festivals occasionally. In addition, there are larger stadium type venues including The Gabba, Lang Park, and Queensland Sport and Athletics Centre that are also used occasionally to host high profile music events. This paper focusses on case studies of two frequently used outdoor concert and festival venues and one occasionally used venue.

This paper is based on the authors' long-term practical experience of managing the community noise impacts of outdoor concerts and festivals in Brisbane and uses case studies to illustrate real world implementation of practical noise management strategies and the range of outcomes that can be reasonably expected.

2 NOISE MITIGATION AND MANAGEMENT MEASURES

There are a number of mitigation measures, both acoustical and non-acoustical that can improve community acceptance of an event and reduce the risk of noise complaint. In this paper, site selection, speaker arrangement, event scheduling, event frequency, genre of event and community engagement will be discussed.

2.1 Site Selection

Site selection is a significant factor in the community response to amplified music noise. Both in terms of acoustical and non-acoustical factors. Acoustically, sites with good physical separation between the stage and sensitive receivers and which have background masking noise, such as high volumes of traffic, show higher levels of community acceptance. The key non-acoustical factors that influence community acceptance are the historical use, order of occupancy and character of the area. A venue with a long history of hosting outdoor concerts and

festivals will typically have greater community acceptance compared to a location that has not been used before or which has been used infrequently. In terms of the character of an area, a venue located in a cultural or commercial precinct will fare better than a site located in a residential area. Finally, the event's relationship with the community itself can improve acceptance, e.g. a local community focused cultural event will generally have a higher level of community acceptance than a commercial music event focused on attracting an audience broader than the local community.

2.2 Event Scheduling and Frequency

In situations where venues are used regularly for outdoor concerts and festivals, scheduling needs to be carefully considered. Our review of event data identified that in well located spaces, amplified music events can be held multiple times per month with minimal complaints if well located and managed. At the venues considered in the below case studies, we observed a level of community acceptance that appears to be based on an understanding that events are an infrequent occurrence. We also observed that when multiple events are scheduled close to each other or back-to-back, a more negative community response is likely. Case study one in section 3 illustrates the effect of holding a high number of events in a short time-period.

Community acceptance of event scheduling frequency varies from location to location or community to community (as illustrated in the case studies in section 3). Therefore, it is recommended that event operators and regulators carefully monitor the community response to events in each locality, to gain an understanding of what event scheduling frequency will be sustainable in terms of local community acceptance.

2.3 Sound Speaker Arrangement

The arrangement of the sound speakers for an outdoor concert can make a notable difference in the noise level at the nearest residences. This is most applicable for events using temporary outdoor locations, such as sport fields where there is some scope to plan the sound speaker design and direction prior to the event. Modern speaker array technology also has improved the ability to control the speaker throw area, providing good sound levels across the audience location, while minimising speaker throw beyond the venue (Hill, 2020).

2.4 Event Type and Genre

Some types of events have been found to have much lower community impact than others. This effect was found while reviewing the data for case study one in section 3.1. Events that could be classified as classical, choir, ballet and musical theatre had little to no risk of negative community feedback. This is useful in terms of venue management, as scheduling for these types of events can therefore be more frequent without having an increase in community complaints.

Council complaint data reviewed for case study one identified that almost all complaints related to rock, pop, dance, hip-hop and other contemporary genres and sub-genres. Analysis of these events did not clearly show the risk of any one of these contemporary genres being notably greater or lesser. It was also found to be administratively impractical to categorise contemporary event genres.

2.5 Community Engagement

Prior notification of the potentially affected community is a widely implemented form of noise management for outdoor concerts (Hill, 2020), which is a requirement for all outdoor concerts and festivals in Brisbane. Adequate prior notification (e.g. 14 days) provides a number of benefits that increase community acceptance. The notification can provide assurance that the event has been approved, has noise limits and monitoring systems, has a set finish time and contact details for concerns. It also allows a resident to plan their own arrangements to minimise the effect of the noise on any noise sensitive activities (WA Department of Health, 2022).

3 CASE STUDIES

Three case studies are presented below to help illustrate real world examples of noise management for outdoor concerts and festivals in Brisbane. These case studies have been provided to help show the range of outcomes that can occur in terms of community response.

3.1 Case Study One

Case study one relates to an inner-city venue that has been frequently used for outdoor concerts for over 20 years. Events at this location implement the noise mitigation and management measures discussed in section 2. The compliance performance of outdoor concerts at this venue has been reviewed for several review periods, along with the corresponding community complaint records.

The noise limits for outdoor concerts at this location are based on monitoring the $L_{eq,5min}$ with a limit of 110dBC and 100dBA measured at the mixing desk (front of house), which is located 30 metres in front of the stage. Exceedances of the noise limits for the events reviewed, were typically in the range of 1dB to 3dB above the criteria. These exceedances were generally reduced prior to the next 5-minute measurement period.

These noise limits are based on an objective of not greater than L_{eq} 70dBA at the closest noise sensitive premises. This noise level objective is not based on community response, it is based on the noise level that can be practically achieved when hosting an outdoor concert in a metropolitan area (Marchuk and Henry 2016). This is a different approach to noise management than is generally used, whereby the threshold of community annoyance is the basis for setting a sound pressure criterion (e.g. 10% highly annoyed), as often used for transport planning (WHO, 2009).

Data summarising three review periods between 2019 and 2024 are provided in tables 1 to 3 below. A total of all review data is provided in table 4.

Table 1- Case Study One Noise Management Review 2019-2020

Events (Pre-Covid) 23/8/19 to 21/1/2020	Total	Averages	
Overall Period (Days)	151		
Events	14		
Complaints	8	0.6	Average complaints per event
Exceedances	42	3.0	Average exceedances per event
Events with Complaints	6	43%	Percentage of events with complaints
Events with Exceedances	8	57%	Percentage of events with exceedances

Table 2- Case Study One Noise Management Review 2019-2020

Events (Post-Covid) 1/6/2020 to 26/6/2021	Total	Averages	
Overall Period (Days)	390		
Events	12		
Complaints	65	5.4	Average complaints per event
Exceedances	5	0.4	Average exceedances per event
Events with Complaints	8	67%	Percentage of events with complaints
Events with Exceedances	3	25%	Percentage of events with exceedances

Table 3- Case Study One Noise Management Review 2023-2024

Events 1/7/2023 to 30/6/2024	Total	Averages	
Overall Period (Days)	366		
Events	28		
Complaints	32	1.1	Average complaints per event
Exceedances	34	1.2	Average exceedances per event
Events with Complaints	19	68%	Percentage of events with complaints
Events with Exceedances	13	46%	Percentage of events with exceedances

Table 4- Case Study One Noise Management Review, Overall Results

Total of all data	Total	Averages	
Overall Period (Days)	907		
Events	54		
Complaints	105	1.9	Average complaints per event
Exceedances	81	1.5	Average exceedances per event
Events with Complaints	33	61%	Percentage of events with complaints
Events with Exceedances	24	44%	Percentage of events with exceedances

The factor that appears to have the greatest correlation with complaints is the concert schedule frequency. The data indicated that the risk of complaint increases when outdoor concerts occur back-to-back or within a short space of time of each other. The clearest example of this effect occurred in the 2020-2021 review period (Table 2) this period averaged more than five complaints per event.

The large number of complaints in the 2020-2021 review period are mainly attributed to a period where seven events were held over a nine-day period. Despite only three minor exceedances of the noise criteria in the nine days, there were 56 complaints received over this period. This represents 53% of the total complaints in the three review periods.

This is a valuable example showing the need to carefully schedule outdoor concert events so that they are not performed too closely together. In the case of this location, provided that outdoor concerts were not more frequent than four to six events per 30-day period, there was not a notable increase in community complaint.

We should note that the 2020-2021 period was unusual because of the post pandemic reopening. There were several performances that had been rescheduled, and this likely resulted in the overcrowded scheduling of events. If we exclude the 2020-2021 data, we see a typical community response of around one to two complaints per event.

The typical one to two complaints per event appears to indicate a good level of community acceptance of this outdoor concert venue. We suggest the reasons for this include:

- Good separation distance from the nearest residences, which allows outdoor concerts to be held at 100dBA and 110dBC while still achieving a reasonable noise level (e.g. 70dBA) at residences.
- Long term use as an outdoor concert venue. This venue has hosted outdoor concerts since 1989, which has resulted in a high level of community acceptance based on order of occupancy. Most of the higher density residential developments around the venue are of more recent construction.
- Prior notification of events to the local community.
- Adherence to noise limits and advertised finish times.
- Significant masking noise from the high levels of road traffic providing an elevated background noise level at nearby residents.

Overall, this case study illustrates that where a venue is well located and managed and has a history of hosting outdoor concerts, community acceptance can still be high. The key dependency at this venue is the management of the frequency of the event schedule.

3.2 Case Study Two

Case study two relates to a large inner-city venue that has also been frequently used for outdoor concerts and festivals for over 30 years. Events at this location generally implement the noise mitigation and management measures discussed in section 2. A 12-month review of the complaint history was conducted starting in 2023. The results of this review are summarised below:

Table 5 - Case Study Two Noise Management Review

Events 01/01/2023 to 31/12/2023	Total		
Overall Period (Days)	365		
Events	11		
Complaints	25	2.3	Average complaints per event
Events with Complaints	7	63%	Percentage of events with complaints

The noise limits for outdoor concerts and festivals at this location are based on monitoring the $L_{eq,5min}$ with a typical limit of 110dBC and 100dBA measured at the mixing desk (front of house), which is typically located 30 metres in front of the stage. These noise limits generally result in a noise level of 70dBA at the closest noise sensitive premises. A review of performance indicates compliance with the noise limits has been reasonable, with occasional minor exceedances of 1db to 3dB at the mixing desk measurement location. The review identified that the exceedances of criteria were actively reduced during performances.

Despite being located in an inner-city suburb with a moderately dense residential population, community complaint has been minimal. We suggest that reasons for this outcome include:

- The venue has a very long history of use for a wide array of events, including outdoor concerts and festivals. The history of outdoor concerts at the venue predates most of the residential development close to the venue, so the order of occupancy creates a stronger sense of community acceptance.
- Good separation distance from most residences, which allows outdoor concerts to be held at 100dBA and 110dBC while generally achieving a reasonable noise level (e.g. 70dBA) at most residences.
- Substantial prior notification of events to the local community.
- Adherence to noise limits and advertised finish times.
- The scheduling of outdoor concerts at this location is less than that for the venue discussed in case study one, with suitable spacing between events.
- The venue is located in an area with high volume arterial roads. This offers elevated background noise to help mask the effect of amplified music noise. High background noise also increases the likelihood of residents closing their windows (WHO, 2009).

The type of residential construction nearby the venue consists of modern apartments, constructed with better thermal and acoustic insulation compared to older traditional Brisbane timber houses. It would be expected that many of the closest residences will have their windows closed and utilise air conditioning – this will mitigate noise exposure better than traditional timber housing in older low density Brisbane suburbs.

Overall, this case study illustrates that where an outdoor concert and music festival venue is well located and managed and has a long history of hosting large events, community acceptance can be high, despite being exposed to relatively high amplified music levels.

3.3 Case Study Three

Case study three relates to a large sporting venue in a suburban location that is rarely used for outdoor concerts and festivals. This case study is presented to illustrate the effect of holding a large-scale music festival in a predominantly residential area with a low background noise level and a limited history of hosting amplified music events.

In March 2015, an outdoor music festival was held at the venue across two consecutive days (a Friday and Saturday). The festival included multiple stages and a front of house noise limit of $L_{eq,5min}$ 108dBC. The noise limit was based on an objective of not greater than 70dBA at the closest noise sensitive premises. The orientation of the stages and sound speakers were also designed prior to the event with the intent of achieving this objective. There was also notification of residents prior to the festival.

Noise levels measured at the nearest residences generally ranged between $L_{Aeq,5min}$ 66dBA to 70dBA, with a marginal exceedance of the objective (72dBA) being recorded toward the end of the Saturday evening.

Despite prior notification of residents and general compliance with the noise level objective at residences, a relatively large number of community complaints were received for this event. Over the two days a total of 29 community complaints were received, compared to an average of one to two complaints per event for most review periods for the case study one and case study two locations.

While the noise levels at the affected residences in this case study were similar to or less than the levels experienced at the case study one and case study two locations, the community reaction was significantly more negative. We suggest that reasons for this outcome include:

- The venue is primarily used as a sport and recreation facility, without a history of hosting outdoor concerts and festivals. The surrounding community is not accustomed to amplified music noise. The sport and recreation use has significantly less noise impact than amplified music from outdoor concerts and festivals.

- The locality is mainly low density residential in character. The residents are separated from the venue by minor residential streets with low traffic. The background noise level in this area is relatively low and lacking in background masking noise from road traffic. The amenity of the locality was also affected during the music festival by the large number of attendees vehicles being parked in the residential streets, along with the corresponding large increase in foot traffic. This was the significant source of complaint other than noise.

- The music festival had a much longer run time comparted to typical outdoor concerts. The overall length of the festival was ten hours per day (i.e.12pm to 10pm). In comparison, a typical outdoor concert for case study one and case study two will start at 7pm and finish at 10pm and they usually do not occur on back-to-back evenings.

Overall, this case study illustrates that despite prior community notification and generally achieving the noise objective (70dBA), the community response can be very negative if the location does not have a history of outdoor concerts and festivals and if the character of the location has a high level of acoustic amenity with low background noise levels.

4 CONCLUSIONS

Effectively managing the noise impact of outdoor concerts and festivals on communities, requires a comprehensive and multi-faceted approach that goes beyond reliance on sound pressure level criteria alone. This paper has highlighted the importance of strategic site selection, careful event scheduling, consideration of event type, and effective community engagement.

Through the examination of case studies one and two, it is clear that community acceptance can be maintained in a way that helps ensure the ongoing sustainability of the venue operation. By implementing these best practices, venue managers and regulatory authorities can create a balanced environment that enhances cultural experiences and economic benefit, while respecting the needs of surrounding residents.

REFERENCES

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